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10/033,445	12/28/2001	Do Lee-Mi	51876P287	9314

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EXAMINER
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YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

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DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application N .

10/033,445

Applicant(s)

DO ET AL.

Examiner

Marie R. Yamnitzky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001 and 19 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

1. The disclosure is objected to because of the following informalities:

Page 7, lines 6-8, refer to compounds represented by formulae 7-10 as being compounds of the structure of formula 1, but formula 1 is DCM as shown on page 2.

The specification fails to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Claim 1 recites "R<sub>1</sub> and R<sub>2</sub> indicate a ring-containing tertiary amine or a fused ring having 2-(dialkylamino) thienyl ring" whereas the specification recites "R<sub>1</sub> and R<sub>2</sub> are either fused ring structures having a ring-contained tertiary amine or 2-(dialkylamino) thienyl rings". The definition of R<sub>1</sub> and R<sub>2</sub> as set forth in claim 1 encompasses compounds not encompassed by the definition of R<sub>1</sub> and R<sub>2</sub> as set forth in the specification. Also, claims 2-5 define the Y variables in each of the formulae of these claims as "H, OH, or OL where L is a polymer linker subunit" but the specification makes no mention of OL or a polymer linker subunit.

The specification also contains several spelling and grammatical errors.

Appropriate correction is required.

2. Claims 1-11 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a compound represented by chemical formula 6 in which R<sub>1</sub> and R<sub>2</sub> indicate a ring-containing tertiary amine or a 2-(dialkylamino)thienyl group wherein the compound may further be represented by chemical formula 7, 8, 9 or 10 wherein the Y variables independently represent H or OH, and for an electroluminescent device comprising such a compound, does not reasonably provide enablement for a compound represented by chemical

formula 6 in which one or more of  $R_1$  and  $R_2$  independently indicates a fused ring having a 2-(dialkylamino)thienyl ring and/or wherein the compound is further represented by chemical formula 7, 8, 9 or 10 wherein one or more of the Y variables independently represent OL where L is a polymer linker subunit, or for an electroluminescent device comprising such a compound. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The specification does not describe compounds having a fused ring having a 2-(dialkylamino)thienyl ring, and does not describe compounds containing one or more OL groups in which L is a polymer linker subunit.

3. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The use of the term "based" in line 3 of claim 1 and in line 5 of claim 11 confuses the scope of the compound required by claim 1 and the emitting material required by claim 11. It is not clear if a compound/material based on a structure of a chemical formula 6 is a compound/material represented by chemical formula 6, or if modifications may be made to the formula.

The scope of a fused ring having a 2-(dialkylamino) thienyl ring as set forth in claim 1 is not clear. The specification does not described this fused ring.

The scope of compounds of chemical formula 7 as set forth in claim 2 and of chemical formula 10 as set forth in claim 5 is unclear for several reasons. The use of the term “may” renders the scope unclear because it is not clear if  $Y_1$ ,  $Y_2$ ,  $Y_3$ ,  $Y_4$ ,  $m$ ,  $n$ ,  $o$  and  $p$  may be something other than what is recited in the claim. The reference to “OL” and the description of  $L$  as a “polymer linker subunit” renders the scope unclear because there is no description of “OL” in the specification and the scope of a “polymer linker subunit” is unknown. It is also not clear if the requirement that  $L$  be a polymer linker subunit requires the compound of the specified formula to be present in the claimed device in the form of a polymer. The scope of the “ring type amine” that  $Y_1$  and  $Y_3$ , and  $Y_2$  and  $Y_4$  may be, is also unclear. It is not clear if each pair of  $Y$  variables form a ring between themselves and the  $N$ , or between the  $N$  and the ring to which  $N$  is attached. The description of the variables of formulae 7 and 10 is also confusing because claims 2 and 5 first recite “at least one of  $Y_1$  and  $Y_2$  is OL” but later allows  $Y_1$  and  $Y_3$ , and  $Y_2$  and  $Y_4$ , to be a ring type amine. It is not clear if a ring type amine may include or may represent a polymer linker subunit, or if only one ring type amine may be formed since at least one of  $Y_1$  and  $Y_2$  is OL, or if at least one of  $Y_1$  and  $Y_2$  is required to be OL only for those compounds in which  $Y_1$  and  $Y_3$ , and  $Y_2$  and  $Y_4$ , are not a ring type amine.

The use of “e.g.” in line 3 of claim 3 is confusing. It is not clear whether the formula that follows represents the entire scope of chemical formula 8, or if there are other formulae that may be considered to be chemical formula 8.

The use of the term “may” in claims 3 and 4 renders the scope of compounds of chemical formulae 8 and 9 unclear because it is not clear if  $Y_1$ ,  $Y_2$ ,  $m$  and  $n$  may be something other than what is recited in the claim.

Claims 3 and 4 define  $o$  and  $p$  but there is no  $o$  or  $p$  in the formulae shown in these claims.

In claims 3 and 4, the reference to “OL” and the description of  $L$  as a “polymer linker subunit” renders the scope of compounds of chemical formulae 8 and 9 unclear because there is no description of “OL” in the specification and the scope of a “polymer linker subunit” is unknown. It is also not clear if the requirement that  $L$  be a polymer linker subunit requires the compound of chemical formulae 8 and 9 to be present in the claimed device in the form of a polymer.

Claim 7: There is no antecedent basis for “said host material” and proper antecedent basis is lacking for “organic emitting layer”. Claim 1, from which claim 7 directly depends, makes no mention of a host material, and uses the phrase “organic luminescent medium layer” instead of “organic emitting layer”.

Claim 8: Proper antecedent basis is lacking for “said organic material”. It is not clear if “said organic material” refers to the “organic luminescent medium layer” or to the “compound based on a structure of a chemical formula 6”. The structure of the device of claim 8 is also unclear because the spatial relationship between the first and/or second dielectric layer and the organic luminescent medium layer is not clear, and it is not clear what constitutes an “under part” of the cathode. It is not clear if the dielectric layer(s) may be part of the at least one

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organic luminescent medium layer. It is not clear if the dielectric layer(s) must lie between the anode and the cathode, or if the anode and/or cathode may be sandwiched between a dielectric layer and the organic luminescent medium layer.

Claim 9 is drawn to “[t]he method as recited in claim 1” but claim 1 is not drawn to a method. There is no antecedent basis for “said step of making” and proper antecedent basis is lacking for “the organic layer” as recited in claim 9. The limitations imposed by the requirement for “mixing the compound of the chemical formula 6 in polymers matrix and doping it” are not clear because the scope of “polymers matrix” is not clear and because it is not clear what “it” in the phrase “doping it” refers to. The scope of “polymers matrix” is not clear because it is not clear if more than one polymer is required, and because the specification describes PBD, which is not a polymer, as a polymer (e.g. see p. 15, l. 8-10).

Claim 10: Proper antecedent basis is lacking for “said organic emitting layer”.

Claim 11 is incomplete because it does not set forth the chemical formula for chemical formula 6.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2 and 6-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Tang et al. (4,769,292).

Tang et al. disclose an organic electroluminescent device comprising an anode and a cathode, and between the anode and cathode, an organic luminescent medium layer (luminescent zone) comprising tris-(8-hydroxyquinoline)-aluminum (HM-1) as a host material doped with 0.2 mole% 4-(dicyanomethylene)-2,6-[2-(9-julolidyl)ethenyl]-4H-pyran (FD-30). See Example 4 as described at column 44, l. 49-c. 45, l. 29, with reference to see c. 8, lines 54-56 for "HM-1" and c. 13, l. 31-33 for "FD-30".

The compound 4-(dicyanomethylene)-2,6-[2-(9-julolidyl)ethenyl]-4H-pyran is a compound of present formula 6 as in claim 1 in which X is O and each of R<sub>1</sub> and R<sub>2</sub> represent a ring-containing tertiary amine. This compound is also a compound of present formula 2 as in claim 2 wherein each of the Y variables forms a nitrogen-containing ring fused with the phenyl ring to which N is attached.

With respect to present claims 8 and 9, Tang et al. teach that the layers of the device may be made by combining the active materials with film forming polymeric binders having a high dielectric strength (e.g. see c. 39, l. 6-24).

With respect to present claim 10, 0.2 mole% of FD-30 doped in HM-1 provides a concentration of FD-30 that is less than 20 weight% based on the weight of HM-1.

With respect to present claim 11, the claim is interpreted for purposes of comparison to the prior art as if chemical formula 6 as set forth in claim 1 was also set forth in claim 11.



6. Claims 1-3, 5-7 and 9-11 are rejected under 35 U.S.C. 102(a) as being anticipated by JP 2001-19946.

(A machine-assisted translation is provided along with the Japanese language document.)

The prior art discloses compounds of present formulae 6, 7, 8 and 10 as required by claims 1, 2, 3 and 5, respectively (subject to claim interpretation). See formulae (12)-(15), (17), (19) and (24) in the prior art. Compounds represented by these formulae are disclosed for use as luminescent materials in organic EL devices.

With respect to present claims 7 and 10, the device described in paragraph [0084] includes the prior art compound of formula (14), which is a compound represented by present formulae 6 and 7, in the luminescent layer in combination with  $\text{Alq}_3$  as a host material in a ratio of compound (14): $\text{Alq}_3$  of 1:100.

With respect to present claim 9, the prior art teaches that polymers may be included in the luminescent layer (e.g. see paragraphs [0053] and [0064]-[0065]).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2 and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al. (4,769,292) as applied to claims 1, 2 and 6-11 above, and for the further reasons set forth below.

In addition to the one species anticipated by Tang et al. as set forth in the rejection under 35 U.S.C. 102(b), several other species within the scope of the rejected claims are suggested by the prior art.

Tang et al. disclose FD-30 as an example of a fluorescent dicyanomethylenepyran or thiopyran dye. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make a thiopyran dye similar to the pyran dye FD-30 having a thiopyran ring instead of a pyran ring (i.e. a compound of prior art formula (V) in which X is S instead of O; a compound of present formulae 6 and 7 in which X is S). One of ordinary skill in the art would have been motivated to make such a compound in order to provide other fluorescent compounds suitable for use in Tang's electroluminescent device. One of ordinary skill in the art would have reasonably expected that replacing the pyran ring of FD-30 with a thiopyran ring would provide a compound suitable for Tang's purposes since Tang is directed to thiopyran as well as pyran dyes.

Further, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make other pyran and thiopyran dyes within Tang's guidelines in order to provide other fluorescent dyes suitable for use in Tang's device. Tang's FD-27 is an unsymmetrical compound having one p-dimethylaminostyryl group. One of ordinary skill in the art would have been motivated to make similar pyran and thiopyran dyes having two

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aminostyryl groups such as two p-dimethylaminostyryl groups by Tang's teachings that R<sup>6</sup> and R<sup>7</sup> of prior art formula (V) may both be aminostyryl groups and that symmetrical compounds are more conveniently synthesized than unsymmetrical compounds.

9. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

Van Allan et al. (4,145,215) disclose photoconductive compounds represented by present chemical formula 6. For example, see compounds 3, 5 and 7-14 in Table I.

Ermer et al. (5,561,733) disclose compounds represented by present chemical formula 8, 9 or 10 for use as electro-optic waveguide materials. When the compound contains at least one OL group in which L is a polymer linker subunit, the compound is part of a heat-stable polymer matrix (e.g. see c. 5, l. 1-7).

10. Miscellaneous:

In line 1 of claim 1, "electroluminescnce" should read --electroluminescence--.

In line 1 of claim 7, "reicited" should read --recited--.

11. Any inquiry concerning this communication should be directed to Marie R. Yarnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

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The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY  
06/20/03

*Marie R. Yamnitzky*

MARIE YAMNITZKY  
PRIMARY EXAMINER

*1774*